Extensive guidance and standards for pedestrian signal warrants are provided in the MD-MUTCD, and are not duplicated in this Chapter. Pedestrian signals must be designed to meet SHA's current *Accessibility Policy & Guidelines for Pedestrian Facilities along State Highways*. All new or modified traffic signal systems where pedestrian indications are warranted per the MD-MUTCD shall consider Accessible Pedestrian Signals (APS). APSs are devices that communicate information about pedestrian timing in nonvisual formats such as tones, verbal messages or vibrations. APSs are typically used in situations where there are continuous right turns, right turns on red, complex signal operations, traffic circles, wide streets, or other factors that may make it difficult for pedestrians with visual disabilities to cross safely. A study should be conducted to determine if APS is appropriate. See Section 11.4 for more information regarding APS.

Alternative Pedestrian Signal Phasing

The most common type of pedestrian signal phasing provides a "WALK" signal when traffic coming from the same direction has a green light. However, a large number of vehicle/pedestrian collisions at signalized intersections involve left- and right-turning vehicles. One phasing strategy to improve pedestrian safety is to provide a Leading Pedestrian Phase in locations with heavy volumes of right turning traffic, and frequent pedestrian crossings. During the Leading Pedestrian Phase all motor vehicle flows are stopped for 2-4 seconds while pedestrians are given the "WALK" signal. This enables pedestrians to begin the crossing movement in advance of right turning movements. A study can useful in determining if a Leading Pedestrian Phase is appropriate by comparing pedestrian safety benefits versus increased intersection delay. Also, pedestrian phasing can be complemented by geometric design changes that shorten crossing distances.

Pedestrian Signal Timing

A number of factors are used to determine the appropriate pedestrian phase for a given intersection. Each intersection is unique, and requires careful attention to the safety of all users. This section provides some guidance on this issue, however more information is provided in the MD-MUTCD and the AASHTO *Guide to the Planning, Design and Operation of Pedestrian Facilities*.

The pedestrian phase has 2 distinct time periods:

1. WALK interval – this is the beginning part of the pedestrian phase, when the pedestrian is free to leave the curb and begin the journey across the intersection. (represented by WALKING PERSON – symbolizing WALK). This interval lasts a minimum of 4 to 7 seconds, which is enough time to enable the pedestrian to leave the curb and begin the crossing movement.
2. Pedestrian clearance time – This includes the pedestrian change interval which is the time following the WALK interval and is initiated by the flashing UPRAISED HAND. The pedestrian clearance time also includes the yellow change and red

clearance intervals which is the time remaining to a conflicting green light and is indicated by a flashing or steady UPRAISED HAND symbolizing DON'T WALK. The pedestrian clearance time is usually timed using a walking rate of 3.5 feet per second.

When the entire pedestrian phase is taken into account, the actual allowable walking speed for the entire pedestrian interval is slower than 3.5 feet per second.
With respect to pedestrian phases at signalized intersections, the Maryland MUTCD allows for timing the pedestrian phase at a reduced walking rate at locations where pedestrians typically need more time to cross the road.
New technologies (such as automated detection) can make it easier to detect slower pedestrians in the crosswalk, and adjust the signal timing accordingly, while reducing unnecessary delay to motor vehicle traffic during times when slower pedestrians are not present.
Traffic signal preemption systems should address pedestrian as well as motor vehicle clearance needs, whether the approaching vehicle is a train or an emergency vehicle.

Midblock Pedestrian Signals
Careful study should accompany the installation of a mid-block pedestrian signal. If existing gaps in traffic are present and adequate to facilitate a safe pedestrian crossing, installation of an actuated pedestrian signal is not advisable. Pedestrians will take an available gap in traffic and won't be inclined to use the pushbutton, resulting in a general disregard for pushbutton actuation. In locations where there are not adequate gaps in traffic, midblock pedestrian signals provide for increased pedestrian convenience and safety.

Pushbuttons at Pedestrian Signals
Within business districts, main streets, and other areas with substantial pedestrian volumes, a pedestrian signal phase should be automatic. In areas with fewer pedestrians, pushbuttons may be used to reduce delays to vehicular traffic. Pushbuttons shall be a minimum of 2" across in at least one direction. The force required to activate the buttons should not be greater than 5 pounds. It is desirable for pushbuttons to offer confirmation that the button has been pressed (see Figure 11.5). Pushbuttons at accessible pedestrian signals are discussed separately in Section 11.4.

Countdown Signals
Pedestrian countdown signals are particularly helpful because they inform pedestrians of the amount of time remaining in order to complete the crossing (see Figure 11.6). They have been shown to reduce the number of pedestrians that are still in the crosswalk when opposing traffic receives a green signal. The MUTCD requires that no countdown be displayed during the walk interval (steady walking person symbol). The countdown display begins at the start of the flashing upraised hand and ends at the termination of that interval.